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Municipal Police Officers'
Retirement System
Actuarial Valuation
as of
July 1, 1990

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ACTUARIAL CONSULTANTS

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Section I

Introduction

An actuarial valuation of the Municipal Police Officers' Retirement System of the State of Montana has been completed as of July 1, 1990. This valuation was authorized by the Public Employees' Retirement Board under Section 19-9-504, MCA. The purpose of the valuation was to determine the financial position of the fund, the normal cost, and the unfunded accrued liability based upon present and prospective assets and liabilities of the system as of July 1, 1990.

Section II presents an analysis of the results of the actuarial valuation. The numerical findings and membership data supporting this analysis are shown in Section III.

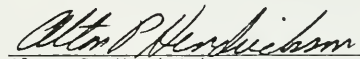
In conducting the actuarial valuation, certain assumptions were made as to the future experience of the system. A summary and discussion of each of the assumptions is contained in Section IV.

The valuation is based upon the Municipal Police Officers' Retirement Act and incorporates all amendments as of July 1, 1990. A summary of the major provisions of the Act is contained in Section V.

Actuarial Certification

The results of the actuarial valuation shown in this report are based upon information provided by the Public Employees' Retirement Division regarding plan participants, plan assets and other matters. The values have been calculated on the basis of actuarial assumptions which, in my opinion, are appropriate for purposes of this valuation.

This valuation has been prepared in accordance with generally accepted actuarial principles and practices and, to the best of my knowledge, fairly reflects the actuarial position of the Municipal Police Officers' Retirement System as of July 1, 1990.



Alton P. Hendrickson
Member, American Academy
of Actuaries

Section II

Analysis of Valuation

Results of Valuation

An actuarial valuation has been conducted as of July 1, 1990 for the Municipal Police Officers' Retirement System. This valuation has determined that the percent of each member's compensation required to fund the benefits as they accrue in the future is 20.70%. The aggregate contribution rate of 35.46% allows 14.76% of compensation to be applied toward the unfunded past service liability. This amount is sufficient to amortize the unfunded past service liability over a period of 26.19 years. The required funding period has decreased from 29.51 years in 1988.

A schedule has been prepared which will amortize the liabilities as of July 1, 1984, July 1, 1986, and July 1, 1988 over the remaining periods of 34 years, 36 years, and 38 years, respectively. The system had an actuarial gain -\$3,506,323 as of July 1, 1990, which will be amortized over a 40-year period. The total contribution rate required to meet this schedule is 32.89% of compensation. This is an decrease over the 1988 rate of 33.34%. These rates are illustrated on Schedule 4.

Valuation of Assets

The improvement in the actuarial position of the Municipal Police Officers' Retirement System was due largely to the handling of the market value gain in assets. Prior to 1988, assets were based upon the cost value. In order to better recognize the actual financial position of the funds, the valuation now recognizes market value gain. To smooth the year to year fluctuations, each year's gain or loss is recognized over a six year period. This means that 1/6 of the gain or loss is recognized the first year, with an additional 1/6 recognized each year thereafter, until the full amount is recognized after six years. The table below illustrates this valuation:

Market Value as of 6/30/90	\$36,585,061
Cost Value as of 6/30/90	\$34,723,078
1990 Market Gain	-150,597 x 1/6
1989 Market Gain	1,027,413 x 1/3
1988 Market Gain	-282,548 x 1/2
1987 Market Gain	-891,015 x 2/3
1986 Market Gain	1,548,887 x 5/6
Prior Market Gain	609,843

Adjusted Market Value	\$36,205,748

Actuarial Assumptions

The actuarial assumptions used in the valuation as of July 1, 1988 were continued in this valuation. A review of the system's data and experience did not reveal any deviations which warranted a change.

Summary of Data

The membership increased during the biennium from 427 active members to 434. The average member is age 37, was employed at age 27 and has completed 9.8 years of service.

The average annual compensation increased slightly from \$22,926 to \$24,194. The total annual payroll is \$10,500,175.

The number of members receiving benefits grew from 400 in 1988 to 422 in 1990. The average retiree is age 65 and retired at age 48 with 21 years of service. The average retirement benefit is \$940, which increased from \$876 in 1988.

Conclusion

Based upon the results of this valuation, the Municipal Police Officers' Retirement System is actuarially sound. The accrued liability of the system grew by \$6.7 million during the biennium. This was more than offset by a \$7.5 million increase in the system's assets.

Section III

Schedule 1

Municipal Police Officers' Retirement System

Normal Cost Allocation

(1) Normal Cost Contribution Rate:

(a) Retirement	18.57%
(b) Death	0.65
(c) Disability	1.20
(d) Withdrawals	0.28

(e) Total Rate	20.70%

(2) Present Value of Future Salaries
Of Current Members

\$ 92,587,795

(4) Present Value of Future Normal Costs.
For Current Members (1(f) * (2))

\$ 19,165,674

Schedule 2

Municipal Police Officers' Retirement System

Present Value of Benefits

(1) Present Value of Benefits - Inactive Members

(a) Retirement	\$ 27,876,032
(b) Death	2,643,833
(c) Disability	8,305,994
(d) Withdrawals	34,974

(e) Total Inactive	\$ 38,860,833

(2) Present Value of Benefits - Active Members

(a) Retirement	\$ 47,195,340
(b) Death	1,012,535
(c) Disability	1,875,415
(d) Withdrawals	390,520

(e) Total Active	\$ 50,473,810

(3) Total Liabilities \$ 89,334,643

Schedule 3

Municipal Police Officers' Retirement System

Liability Allocation and Statutory Funding

(1) Unfunded Past Service Liability

(a) Present Value of Benefits	\$ 89,334,643
(b) Present Value of Future Normal Costs	\$ 19,165,674
(c) Fund Assets	\$ 36,205,748

(d) Unfunded Liability (a)-(b)-(c)	\$ 33,963,221

(2) Contribution Rates Amortized over 26.19 Years

(a) Present Value of Salaries During Next 26.19 Years	\$ 230,103,107
(b) Unfunded Contribution Rate 1(d)/2(a)	14.76%
(c) Normal Cost Rate (Schedule 1)	20.70

(d) Statutory Funding Rate	35.46%

Schedule 4

Municipal Police Officers' Retirement System

Unfunded Liability Amortization Schedule

(1) Biennial Unfunded Past Service Liability Accounts

1984 Liability Account as of 7/1/88	\$	38,135,142
Interest Charge on Liability Account		6,345,687
Contributions Applied to Liability		3,313,288
Interest Credit on Contributions		255,527
1984 Liability Account as of 7/1/90	\$	40,912,014
1986 Liability Account as of 7/1/88	\$	-857,783
Interest Charge on Liability Account		-142,735
Contributions Applied to Liability		-74,527
Interest Credit on Contributions		-5,748
1986 Liability Account as of 7/1/90	\$	-920,243
1988 Liability Account as of 7/1/88	\$	-2,351,032
Interest Charge on Liability Account		-391,212
Contributions Applied to Liability		-204,264
Interest Credit on Contributions		-15,753
1988 Liability Account as of 7/1/90	\$	-2,522,227

(2) Actuarial Gain/Loss

Current Unfunded Liability (Schedule 3)	\$	33,963,221
Less 1984 Liability Account		40,912,014
Less 1986 Liability Account		-920,243
Less 1988 Liability Account		-2,522,227

1990 Liability Account as of 7/1/90	\$	-3,506,323

(3) Required Contribution Rate

Normal Cost Rate (Schedule 1)	20.70%
Rate to Fund 1984 Liability Over 34 Years	14.41
Rate to Fund 1986 Liability Over 36 Years	-0.31
Rate to Fund 1988 Liability Over 38 Years	-0.82
Rate to Fund 1990 Liability Over 40 Years	-1.09

Contribution Rate for 40-Year Schedule	32.89%

Schedule 5

Table 1

Municipal Police Retirement System
Comparison of Valuations

	<u>1988</u>	<u>1990</u>
(1) Unfunded Past Service Liability		
(a) Present Value of Benefits	\$82,286,939	\$89,334,643
(b) Present Value of Future Costs	\$18,361,666	\$19,165,674
(c) Fund Assets	\$28,752,152	\$36,205,748
(d) Unfunded Liability	\$35,173,121	\$33,963,221
(2) Amortization Period and Contribution Rates		
(a) Years for Amortization	29.63	26.19
(b) Unfunded Contribution Rate	14.739%	14.76%
(c) Normal Cost Rate	20.665	20.70
(d) Statutory Funding Rate	35.404%	35.46%
(e) Amortization Schedule Rate*	33.324%	32.89%
(3) Active Members		
(a) Number of Members	426	434
(b) Annual Payroll	\$ 9,842,333	\$10,500,176
(c) Average Annual Salary	\$ 23,104	\$ 24,194
(4) Inactive Members		
(a) Number of Retired	291	297
(b) Number of Disabled	89	96
(c) Number of Survivors	23	29
(d) Annual Benefits	\$ 4,202,784	\$ 4,683,008
(e) Average Monthly Benefit	\$ 869	\$ 925

* Rate required to amortize each year's new liabilities over 40 years.

Table 2
Municipal Police Officers' Retirement System
Comparison of Active Members

City	1988		1990	
	Active Members	Annual Salary	Active Members	Annual Salary
Anaconda	16	\$ 376,765	16	\$ 349,304
Baker	2	\$ 51,357	4	\$ 94,639
Billings	100	\$ 2,402,805	103	\$ 2,585,625
Bozeman	26	\$ 613,459	24	\$ 609,531
Butte	40	\$ 963,644	39	\$ 1,052,661
Glasgow	8	\$ 170,253	6	\$ 127,105
Glendive	9	\$ 170,702	12	\$ 247,177
Great Falls	57	\$ 1,348,574	56	\$ 1,417,533
Havre	15	\$ 285,927	15	\$ 320,989
Helena	38	\$ 808,216	36	\$ 828,619
Kalispell	21	\$ 514,608	23	\$ 598,622
Lewistown	11	\$ 193,050	10	\$ 190,811
Livingston	10	\$ 179,602	10	\$ 189,291
Miles City	15	\$ 296,525	13	\$ 278,496
Missoula	58	\$ 1,395,901	60	\$ 1,489,307
Plains	1	\$ 18,180	1	\$ 20,424
Red Lodge	0	\$ 0	6	\$ 100,037
Total	427	\$ 9,789,568	434	\$10,500,176

Table 3
Municipal Police Officers' Retirement System
Comparison of Members Receiving Benefits

City	1988		1990	
	Inactive Members	Annual Benefit	Inactive Members	Annual Benefit
Anaconda	18	\$ 193,413	23	\$ 258,100
Baker	1	\$ 8,692	1	\$ 8,770
Billings	76	\$ 809,552	83	\$ 919,927
Bozeman	15	\$ 149,299	16	\$ 180,116
Butte	58	\$ 578,665	60	\$ 679,215
Glasgow	4	\$ 40,119	4	\$ 40,938
Glendive	6	\$ 57,526	7	\$ 72,966
Great Falls	78	\$ 837,448	74	\$ 853,972
Havre	17	\$ 161,150	16	\$ 154,125
Helena	26	\$ 278,551	29	\$ 326,688
Kalispell	18	\$ 174,848	19	\$ 215,878
Lewistown	10	\$ 82,560	10	\$ 86,145
Livingston	9	\$ 84,831	9	\$ 85,921
Miles City	17	\$ 146,538	19	\$ 188,832
Missoula	47	\$ 517,841	50	\$ 595,659
Red Lodge	0	\$ 0	2	\$ 15,756
Total	400	\$ 4,121,033	422	\$ 4,683,008

Schedule 6

Table 1

Municipal Police Officers' Retirement System

Number of Active Members

Years of Service	Member's Age									Total
	20-25	25-29	30-34	35-39	40-44	45-49	50-54	55-59	OVER 60	
0-4	20	52	35	15	12	2				136
5-9		18	38	17	10	2		1		86
10-14			13	37	31	4	6	1		92
15-19				23	55	16	2		1	97
20-24					9	7	1	3		20
25-29							3			3
30-34										
35-39										
40-UP										
Total	20	70	86	92	117	31	12	5	1	434

Table 2
Municipal Police Officers' Retirement System
Average Salaries of Active Members

Years of Service	Member's Age									Total
	20-25	25-29	30-34	35-39	40-44	45-49	50-54	55-59	OVER 60	
0-4	18064	19174	20452	20466	19973	17303				19525
5-9		23218	23301	22663	23791	32020		25157		23439
10-14			24142	26019	26158	24840	24708	28587		25691
15-19				26187	28071	29541	28332		26836	27859
20-24					33477	30834	25385	34681		32328
25-29							38831			38831
30-34										
35-39										
40-UP										
Total	18064	20214	22269	24535	26784	28597	28899	31558	26836	24194

Table 3
Municipal Police Officers' Retirement System
Number of Retired Members

Member's Service	Recipient's Age									Total
	< 45	45-49	50-54	55-59	60-64	65-69	70-74	75-79	Over 80	
0-4										
5-9							1		2	3
10-14								1		1
15-19						1	7		5	13
20-24	5	23	28	41	48	40	18	19	22	244
25-29		1	1	7	1	6	2		8	26
30-34			1	1	2	2		1	2	9
35-39						1				1
40-UP										
Total	5	24	30	49	51	50	28	21	39	297

Table 4
Municipal Police Officers' Retirement System
Average Benefits of Retired Members

Member's Service	Recipient's Age									Total
	< 45	45-49	50-54	55-59	60-64	65-69	70-74	75-79	Over 80	
0-4										
5-9							955		800	851
10-14								955		955
15-19						882	837		774	816
20-24	1236	1167	1075	923	878	819	855	806	822	921
25-29		1590	1246	1380	748	1017	926		819	1067
30-34			1736	1728	1329	1137		946	806	1217
35-39						1783				1783
40-UP										
Total	1236	1185	1103	1005	893	876	859	820	813	940

Table 5
Municipal Police Officers' Retirement System
Number of Disabled Members

Member's Service	Recipient's Age									Total
	< 45	45-49	50-54	55-59	60-64	65-69	70-74	75-79	Over 80	
0-4	3		1							4
5-9	2	5	4	3	1	3	2	1	1	22
10-14	11	2	5	3	5	1		2	3	32
15-19		2	5	1	3	4	2		2	19
20-24			1	3	2	3	1	4	1	15
25-29							1	1		2
30-34								1	1	2
35-39										
40-UP										
Total	16	9	16	10	11	11	6	9	8	96

Table 6
Municipal Police Officers' Retirement System
Average Benefits of Disabled Members

Member's Service	Recipient's Age									Total
	< 45	45-49	50-54	55-59	60-64	65-69	70-74	75-79	Over 80	
0-4	759		886							791
5-9	878	912	863	838	811	873	859	850	882	871
10-14	957	839	907	878	891	850		866	824	902
15-19		1062	993	856	883	786	845		859	902
20-24			955	897	1124	871	955	824	736	900
25-29							955	897		926
30-34								674	897	785
35-39										
40-UP										
Total	910	929	924	869	924	839	886	828	838	888

Table 8
Municipal Police Officers' Retirement System
Number of Survivors

Member's Service	Recipient's Age									Total
	< 45	45-49	50-54	55-59	60-64	65-69	70-74	75-79	Over 80	
0-4	3	1	1		1					6
5-9	3	2	1	2	1				1	10
10-14	1		1	1					1	4
15-19		1	1		2				1	5
20-24							2			2
25-29										
30-34									2	2
35-39										
40-UP										
Total	7	4	4	3	4		2		5	29

Table 8
Municipal Police Officers' Retirement System
Average Benefits of Survivors

Member's Service	Recipient's Age									Total
	< 45	45-49	50-54	55-59	60-64	65-69	70-74	75-79	Over 80	
0-4	924	897	886		897					909
5-9	907	875	955	919	897				855	901
10-14	844		955	811					731	835
15-19		962	1176		883				657	912
20-24							777			777
25-29										
30-34									890	890
35-39										
40-UP										
Total	905	902	993	883	890		777		804	886

Section IV

Actuarial Funding Method

The true cost of the Municipal Police Officers' Retirement System will be determined by its future experience. In determining the financial requirement of the fund, certain assumptions were made as to the expected future experience. This section summarizes the funding method applied as well as the basic assumptions used.

Any variations in the actual experience of the fund from those assumed in this valuation may cause changes in the projected future costs of the fund. It is therefore necessary that the actuarial assumptions be reviewed from time to time with adjustments as experience warrants. It is also important that regular valuations be performed to determine the financial effect of variations between the actual and assumed experience.

The assumptions shown below were based upon the past experience of the fund together with the projections as to future experience.

The method of funding employed is commonly referred to as the entry age normal cost method. This method establishes a normal cost of each fund as well as an unfunded accrued liability. The normal cost is the level percentage of total salaries required to fund the benefits, assuming this percentage has been contributed since each member's entry into the fund.

The unfunded accrued liability represents the excess of the present value of total liabilities over the present assets of the fund and the present value of expected future contributions for the normal cost.

In order to maintain the fund on an actuarially sound basis, the rate of contribution should be such as to meet the normal cost in addition to making progress towards the amortization of the unfunded liability.

Discussion of Actuarial Assumptions

Mortality Rates

The mortality rates for males and females are based upon the 1983 Group Annuity Mortality Table, and apply to both active members and those receiving benefits.

Disability Rates

The disability rates for males and females are based upon the 1983 Disability Table.

Withdrawal Rates

The withdrawal rates are based upon the actual experience of the system as determined in the 1987 withdrawal experience study.

Salary Scale

The rates of salary increase are based upon an assumed compounded growth rate of 6.5% per annum.

Investment Earnings

It was assumed that the investment earnings would be 8% compounded annually.

Administrative Expenses

It was assumed that the system would incur no administrative expenses beyond those provided by investment earnings in excess of 8%.

Termination Benefits

It was assumed that all members terminating with less than twenty years of service would receive an immediate withdrawal of their member contributions with interest. It was further assumed that members with twenty or more years of service would select the most advantageous benefits under the given assumptions.

Illustration of Actuarial Assumptions

Mortality Rates

The mortality rates are based upon the 1983 Group Annuity Mortality Table.

<u>Age</u>	<u>Deaths Per 10,000 Male Members</u>	<u>Deaths Per 10,000 Female Members</u>
25	5	3
30	6	3
35	9	5
40	12	7
45	22	10
50	39	16
55	61	25
60	92	42
65	156	71
70	275	124
75	446	240
80	741	429
85	1,148	699

Disability Rates

The disability rates are based upon the 1983 Disability Table.

<u>Age</u>	<u>Disabilities per 10,000 Male Members</u>	<u>Disabilities per 10,000 Female Members</u>
25	1	1
30	2	3
35	3	5
40	6	9
45	12	15
50	20	22
55	51	41
60	105	87

Withdrawal Rates

The withdrawal rates illustrated below reflect the turnover experienced by the Police Officer's Retirement System.

<u>Age</u>	<u>Withdrawals Per 10,000 Active Members</u>
25	648
30	386
35	169
40	39
45	21
50	0

Salary Scale

The salary increases are based upon an assumed compounded growth rate of 6.5% per annum.

Investment Earnings

Future investment earnings are assumed to be 8% compounded annually.

Administrative Expenses

It was assumed that the administrative expenses would be recovered by investment earnings in excess of 8%.

Section V

Summary of Benefits and Contributions

Effective Date -	July 1, 1927
Member Contributions -	6% of salary for police officers employed prior to July 1, 1979 and 7 1/2% of salary for police officers employed on or after July 1, 1979.
City Contributions -	13.02% of active police officers' salaries, plus any amounts required to fund excess past service liabilities.
State Contributions -	15.06% of active police officers' salaries.
Retirement Benefit -	Minimum service: 20 years Minimum age: a) if first employed on or before July 1, 1975, none b) if first employed after July 1, 1975, age 50 Normal form: Life payments to the member and, upon the member's death, continuing to the surviving spouse. In the event there is no surviving spouse, or the spouse subsequently dies, payments continue to dependent children, if any. Benefit: 50% of the average monthly salary during the highest 36 consecutive months of earnings plus 1% of the average monthly salary for each additional year of service in excess of 20 years, up to a maximum of 60%.
Disability Benefit -	Greater of 50% of the final average monthly salary or the accrued retirement benefit.
Death Benefit -	50% of the average monthly salary, payable to surviving spouse or minor children.

Termination Benefit -

Prior to completion of 10 years of service, return of accumulated contributions without interest. After completion of 10 years of service, return of accumulated contributions with interest.

Benefit Adjustments -

A supplemental benefit shall be paid to members or beneficiaries who were receiving payments prior to July 1, 1975. The supplemental benefit shall be the amount needed to provide a benefit of 50% of the base salary paid in the previous calendar year to a newly confirmed police officer in the city in which the member was employed.

A similar benefit is provided to members who retire after July 1, 1975 but prior to July 1, 1985. This benefit is based on the 1985 salary of a newly confirmed police officer.

The fund is reimbursed by the state auditor for the supplemental benefits.